

fluid is completely utilised thereby, simultaneously, negating any possible clogging of 'nest-crater' coming on the way in hatching of young ones from the bottom of the nest chamber. In the gharial upto approx. 37% of the total egg weight remain as residual egg-fluid which have a three-fold function, maintaining pressure inside the egg, providing a slimy medium for hatching and holding empty eggs at the hatching site as visual markers —, that increase the survival value of hatchlings. The

retention of fluid for hatching may be considered as an advanced stage in evolution of gharial over the Emydids.

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20. THE DISTRIBUTION AND POPULATION OF CROCODILES IN THE PROVINCES OF SIND AND BALUCHISTAN (PAKISTAN)

In the Indian subcontinent, crocodiles have been plentiful in the past. Even gharial, which is quite uncommon these days, had previously good populations. According to Adams (1967), quoted by Whitaker and Daniel (1978), "Gavial abounds in all the great rivers of North India — 10 or 20 may be seen together". Their range extended throughout the Gangetic system, west to Pakistan and north east to Brahmaputra. Similarly, marsh crocodiles were also abundant. Smith (1931) pointed out that Muggar were once extremely common in the former range from river Dasht

in the extreme west of Pakistan to Assam in North Eastern India and over most of the Peninsula and Sri Lanka. According to Daniel (1976) marsh crocodile is still wide spread in India occurring in almost all the areas of its known distribution; the gharial however remains the most endangered crocodylian of the subcontinent.

Although marsh crocodiles, being better adaptable are still reported to occur in patches in some of their former habitats in Sind and Baluchistan (Khan and Mirza 1976, Khan and Malik, per. comm.), the last available field

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report mentioned only 2-3 gharial remaining between the Sukkur and Guddu Barrages (Pelleri, G. 1975).

In Pakistan, scientific surveys have never been carried out before for locating various sites of crocodile occurrence and estimating their population. As the availability of a suitable technique is a pre-requisite for such surveys, I attempted various methods for testing their usefulness under prevailing conditions. These are discussed below:

Methods and Material: Preliminary information on the availability of crocodiles was obtained from the provincial Game Wardens in Punjab, Sind and Baluchistan and other senior forest officers. Indications were positive, therefore, investigations were first started in the province of Sind, Questionnaires were prepared in the local language and sent to all district game wardens in Sind through offices of the Sind Wildlife Management Board (see appendix I). These were distributed to Game Inspectors and Game Watchers for obtaining information from the local fishermen, boatmen, waterfowl hunters and other knowledgeable persons.

The questionnaires when received back were scrutinized and localities where crocodiles were reported, were marked on a map. A survey of such localities was then conducted in February, 1983, searching the reported sites with the help of game staff and local villagers. Crocodiles were counted at their basking sites in Nara canal, Lakes, Dhands using 8 x 40 and 10 x 50 binoculars. This was usually followed by night observations, catching reflection of the crocodile eyes with the help of a search light. At this stage of investigation, no distinction was attempted between juveniles and adults.

Two types of data were collected; number of crocodiles which were actually sighted and

counted on that particular day or night, and the number of crocodiles presence of which were either indicated by more than one local villagers or were evident from their signs like faeces, tracks etc.

In Baluchistan, information was obtained from senior forest officers, college teachers and notable shikaris through letters and personal contacts. A wetland when known through the above procedure to have been a previous or known as a present habitat of crocodiles, was visited for obtaining further information from local inhabitants; and when confirmed, the respective sites were then searched and crocodiles counted or estimated.

Similar surveys could not be undertaken in other parts of the country as wild populations are believed to have become extinct several years ago.

RESULTS

Crocodile surveys, conducted in the provinces of Sind and Baluchistan gave the following results:

Provinces	Locality	Number counted	Number estimated*
<i>Sind</i>			
(District Khairpur, Nawab Shah and Sanghar)	Nara canal Lakes, 'Dhands'	17 19	120
<i>Baluchistan</i>			
Sibi	Nari Nadi	3	10
Lasbela	Titian Nai	7	—
	Hub river	14	50
	Hub dam	—	5
Makran	Nihang Kaur	11	—**
	Kech Kaur		
	Mirani Dam		

* This is confined strictly to the areas visited personally.

** Crocodile habitats were so widespread that even approximate number was difficult to estimate in this first attempt.

The above results reveal that crocodiles, though uncommon are still available in many parts of Pakistan. Some of these areas have great potential for crocodiles. Nara canal and other lakes in Sind provide not only suitable habitats to the present crocodile populations but in view of their size, have also the capacity to accommodate many more crocodiles, similarly the Hub river and Hub Dam in Baluchistan can hold larger populations.

It is therefore concluded that unless sophisticated equipment and qualified staff is available for accurate population counts of crocodiles, various methods adopted in the above studies could be utilized successfully to discover new sites of crocodilian occurrence and measure any change in their populations.

The present surveys were not expected to yield precise population estimates as they are preliminary in nature. Obviously, it is possible to obtain such information provided more time is given to individual sites for detailed interviews with local knowledgeable persons and more time is spent in surveys and recording observations.

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APPENDIX I

QUESTIONNAIRE FOR OBTAINING INFORMATION
ON CROCODILES

Forest Range: Forest Division:
Name & Designation of the Game Official:
Name, occupation and
address of the respondent:

Question

1. Please indicate the sites where more than 5 crocodiles could be seen:
Marsh crocodiles:
Number Locality
Number Locality
2. Please indicate if such crocodiles are available in same localities throughout the year.
Yes/No
3. How many egg-laying sites have you seen so far and where? Indicate localities:

4. Are crocodiles increasing in number or decreasing?
Increasing/Decreasing
5. If decreasing, please indicate reasons:
a) They are being hunted.
b) They are starving.
c) Their previous habitats are no longer suitable.
6. Where have you seen the biggest crocodile?
Approximate size Month/Year
Locality
7. Is it available now? Yes/No
8. What is the best time for spotting the crocodiles?
Season Time
9. Could you help in locating crocodiles.
Yes/No

21. NET-BOUND DEATH OF MARINE TURTLE *LEPIDOCHELYS*
OLIVACEA OFF WEST BENGAL COAST DURING 1984-85

It is now known that migration of the olive ridley turtle *Lepidochelys olivacea* into Bay of Bengal off the nesting sites at Gahirmatha beach of Orissa and the islands of Sundarbans, West Bengal commence by late October and the peak is reached by December-January (Silas *et al.* 1984). In this part of the Bay of Bengal extensive fishing also starts by late October.

From a survey during 1984-85 fishing season (October-February) it is recorded that a total of 438 turtles (186 males and 252

females) died following accidental capture in the nets of fishermen operating off-shore Digha, Jaldah and Junput in West Bengal. It is to be stated here that the fishermen usually do not let these turtles free in the sea water but carry these to the shore hoping revival following exposure to air. But again according to them, only 7-8% of such turtles revive. And for this reason in each fishing season a large number of carcasses at varying stage of decomposition can be seen at trade sites.

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